CHAIN-OF-CUSTODY / Analytical Request Document

Pace Analytical™ www.pacelabs.com

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page: of

Section A Required Client Information:

Company: FMC

Address: PO BOX 4111

POCATELLO, ID 83202

Email To: brian.mcginnis@fmc.com

Phone: Fax:

Requested Due Date/TAT:

Section B Required Project Information:

Report To: Ericka Vallance, Hydrometrics

Copy To: Rob Hartman, MWH

Bruce Wallin, ECC I

Purchase Order No.:

Project Name: FMC

Project Number: RCRA-CERCLA-CALCINER

Section C Invoice Information:

Attention: Brian McGinnis

Company Name: FMC

Address: PO BOX 4111 POCATELLO ID 83202

Pace Quote Reference:

Pace Project Manager: Kabor Xiong

Pace Profile #:

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER

☐ UST ☑ RCRA ☐ OTHER

Site Location STATE: ID

Requested Analysis Filtered (Y/N)

Section D Required Client Information

SAMPLE ID (A-Z, 0-9 / , -) Sample IDs MUST BE UNIQUE

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COMPOSITE START TIME	COMPOSITE END/GRAB DATE	COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test Y/N	300.0/IC **	TOTAL METALS 6020	TOTAL METALS 6010	FLUORIDE (ISE)	TOTAL PHOSPHORUS	Ammonia	Ortho Phosphorus	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	505121A	WT	G	–	–	6/26/15	0905		4	1	1	2							X	X	X	X	X	X			Fed Ex Air Bill #
2	505604	WT	G	–	–		0930																				8713 2040 9665
3	505108AA	WT	G	–	–		1005																				sample
4	505108AB	WT	G	–	–		1005																				matrix spike
5	505108AC	WT	G	–	–		1005																				matrix spike dup.
6	505704	WT	G	–	–	"	1030		"	"	"	"								"	"	"	"	"	"	"	
7	505	WT	G	–	–																						
8	505	WT	G	–	–																						
9	505	WT	G	–	–																						
10	505	WT	G	–	–																						
11	505	WT	G	–	–																						
12	505	WT	G	–	–																						

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS
**300.0- Cl, SO4, Nitrate, F	Walter Crane Hydrometrics	6/26/15	11:30	[signature] DAK	6/26/15	1195	Temp in °C: 3.1
6010: Cadmium, Potassium; 6020: Arsenic, Selenium							Received on Ice (Y/N): Y
Total Phos sub to Pace-VM by 6010 only on wells 108, 121, 122 & 123							Custody Sealed Cooler (Y/N): Y
							Samples Intact (Y/N): Y

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Walter Crane

SIGNATURE of SAMPLER: Walter DATE Signed (MM/DD/YY): 06/26/15

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

Fax 612 607 6444

F-ALL-Q-020rev.08, 12-Oct-2007

Pace Analytical	Document Name: **Sample Condition Upon Receipt Form**	Document Revised: 23Feb2015 Page 1 of 1
	Document No.: **F-MN-L-213-rev.13**	Issuing Authority: Pace Minnesota Quality Office

Sample Condition Upon Receipt

Client Name: ALS Env.

Project #: WO# : 10312267

10312267

Courier: ☑ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace ☐ SpeeDee ☐ Other:

Tracking Number: 871320409665

Custody Seal on Cooler/Box Present? ☑ Yes ☐ No **Seals Intact?** ☑ Yes ☐ No

Optional: Proj. Due Date: Proj. Name:

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☐ None ☑ Other: PB **Temp Blank?** ☑ Yes ☐ No

Thermometer Used: ☐ B88A9130516413 ☑ B88A912167504 ☐ B88A0143310098 **Type of Ice:** ☑ Wet ☐ Blue ☐ None ☐ Samples on ice, cooling process has begun

Cooler Temp Read (°C): 3.0 **Cooler Temp Corrected (°C):** 3.1 **Biological Tissue Frozen?** ☐ Yes ☐ No ☑ N/A

Temp should be above freezing to 6°C **Correction Factor:** 0.1 **Date and Initials of Person Examining Contents:** 6/27/15

USDA Regulated Soil (☑ N/A, water sample)

Did samples originate in a quarantine zone within the United States: AL, AR, AZ, CA, FL, GA, ID, LA. MS, NC, NM, NY, OK, OR, SC, TN, TX or WA (check maps)? ☐ Yes ☐ No

Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? ☐ Yes ☐ No

If Yes to either question, fill out a Regulated Soil Checklist (F-MN-Q-338) and include with SCUR/COC paperwork.

				COMMENTS:
Chain of Custody Present?	☑ Yes	☐ No	☐ N/A	1.
Chain of Custody Filled Out?	☑ Yes	☐ No	☐ N/A	2.
Chain of Custody Relinquished?	☑ Yes	☐ No	☐ N/A	3.
Sampler Name and/or Signature on COC?	☐ Yes	☑ No	☐ N/A	4.
Samples Arrived within Hold Time?	☑ Yes	☐ No	☐ N/A	5.
Short Hold Time Analysis (<72 hr)?	☑ Yes	☐ No	☐ N/A	6.
Rush Turn Around Time Requested?	☐ Yes	☑ No	☐ N/A	7.
Sufficient Volume?	☑ Yes	☐ No	☐ N/A	8.
Correct Containers Used?	☑ Yes	☐ No	☐ N/A	9.
-Pace Containers Used?	☑ Yes	☐ No	☐ N/A	
Containers Intact?	☑ Yes	☐ No	☐ N/A	10.
Filtered Volume Received for Dissolved Tests?	☑ Yes	☐ No	☐ N/A	11. Note if sediment is visible in the dissolved container
Sample Labels Match COC?	☑ Yes	☐ No	☐ N/A	12. missing sample see comments on back.
-Includes Date/Time/ID/Analysis Matrix: WT 6/27				
All containers needing acid/base preservation have been checked?	☑ Yes	☐ No	☐ N/A	13. ☑ HNO_3 ☑ H_2SO_4 ☐ NaOH ☐ HCl
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO_3, H_2SO_4, HCl<2; NaOH >9 Sulfide, NaOH>12 Cyanide)	☑ Yes	☐ No	☐ N/A	Sample # 1-6
Exceptions: VOA, Coliform, TOC, Oil and Grease, DRO/8015 (water) DOC	☐ Yes	☐ No	☑ N/A	Initial when completed: Lot # of added preservative:
Headspace in VOA Vials (>6mm)?	☐ Yes	☐ No	☑ N/A	14.
Trip Blank Present?	☐ Yes	☐ No	☑ N/A	15.
Trip Blank Custody Seals Present?	☐ Yes	☐ No	☑ N/A	
Pace Trip Blank Lot # (if purchased):				

CLIENT NOTIFICATION/RESOLUTION **Field Data Required?** ☐ Yes ☐ No

Person Contacted: Walter Crane Date/Time: 6/29

Comments/Resolution: "Missing sample does not exist" per client.

Project Manager Review: Kristy Xiong **Date:** June 29, 2014

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers).

Chain of Custody

WO# : 1249367
PM: MMW Due Date: 07/10/15
CLIENT: PACE MPLS

www.pacelabs.com

Workorder: 10312267 **Workorder Name:** RCRA-CERLCA-CALCINER **Owner Received Date:** 6/27/2015 **Results Requested By:** 7/10/2015

Report to:	Subcontract to:
Kabor Xiong Pace Analytical Services, Inc. 1700 Elm Street, Suite 200 Minneapolis, MN 55414 Phone (612)607-1700 Fax (612)607-6444	Pace Analytical Virginia MN 315 Chestnut Street Virginia, MN 55792 Phone (218)742-1042

Item	Sample ID	Sample Type	Collect Date/Time	Lab ID	Matrix	Preserved Containers: HNO3	Requested Analysis: Total phos (6010)	LAB USE ONLY
1	505121A	PS	6/26/2015 09:05	10312267001	Water	1	X	001
2	505604	PS	6/26/2015 09:30	10312267002	Water	1	X	002
3	505108A(ABC)	RQS	6/26/2015 10:05	10312267003	Water	3	X	003
4	5051704	PS	6/26/2015 10:30	10312267006	Water	1	X	004
5								

Comments:

Transfers	Released By	Date/Time	Received By	Date/Time
1	Kabor Xiong	6/29/15	[illegible]	6/30/15 1310
2				
3				

Cooler Temperature on Receipt 3.3/2.9 °C **Custody Seal** (Y) or N **Received on Ice** (Y) or N **Samples Intact** (Y) or N

****In order to maintain client confidentiality, location/name of the sampling site, sampler's name and signature may not be provided on this COC document. This chain of custody is considered complete as is since this information is available in the owner laboratory.*

Pace Analytical®	Document Name: Sample Condition Upon Receipt Form	Document Revised: 23Feb2015 Page 1 of 1
	Document No.: F-VM-C-001-Rev.09	Issuing Authority: Pace Virginia, Minnesota Quality Office

Sample Condition Upon Receipt

Client Name: Pacemn

Project #: WO# : 1249367

1249367

Courier: ☒ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace ☐ Other:

Tracking Number:

Custody Seal on Cooler/Box Present? ☒ Yes ☐ No Seals Intact? ☒ Yes ☐ No

Optional: Proj. Due Date: Proj. Name:

Packing Material: ☒ Bubble Wrap ☒ Bubble Bags ☐ None ☐ Other:

Temp Blank? ☒ Yes ☐ No

Thermometer Used: ☒ 140792808 Type of Ice: ☒ Wet ☐ Blue ☐ None ☒ Samples on ice, cooling process has begun

Cooler Temp Read °C: 2.0/2.6 Cooler Temp Corrected °C: 2.3/2.9

Temp should be above freezing to 6°C Correction Factor: -0.3

Biological Tissue Frozen? ☐ Yes ☐ No ☒ NA

Date and Initials of Person Examining Contents: 6/30/15 TR

				Comments:
Chain of Custody Present?	☒ Yes	☐ No	☐ N/A	1.
Chain of Custody Filled Out?	☒ Yes	☐ No	☐ N/A	2.
Chain of Custody Relinquished?	☒ Yes	☐ No	☐ N/A	3.
Sampler Name and Signature on COC?	☐ Yes	☐ No	☒ N/A	4.
Samples Arrived within Hold Time?	☒ Yes	☐ No	☐ N/A	5.
Short Hold Time Analysis (<72 hr)?	☐ Yes	☒ No	☐ N/A	6.
Rush Turn Around Time Requested?	☐ Yes	☒ No	☐ N/A	7.
Sufficient Volume?	☒ Yes	☐ No	☐ N/A	8.
Correct Containers Used?	☒ Yes	☐ No	☐ N/A	9.
-Pace Containers Used?	☒ Yes	☐ No	☐ N/A	
Containers Intact?	☒ Yes	☐ No	☐ N/A	10.
Filtered Volume Received for Dissolved Tests?	☐ Yes	☐ No	☒ N/A	11. Note if sediment is visible in the dissolved containers.
Sample Labels Match COC? 6/30/15 TR	☒ Yes	☒ No	☐ N/A	12. Rec'd one sample for 003 + a sample for 004 + 005 (not on coc). Use all 3
-Includes Date/Time/ID/Analysis Matrix: WT				
All containers needing acid/base preservation will be checked and documented in the pH logbook.	☒ Yes	☐ No	☐ N/A	See pH log for results and additional preservations documentation 003 per mco.
Headspace in Methyl Mercury Container	☐ Yes	☐ No	☒ N/A	13.
Headspace in VOA Vials (>6mm)?	☐ Yes	☐ No	☒ N/A	14.
Trip Blank Present?	☐ Yes	☐ No	☒ N/A	15.
Trip Blank Custody Seals Present?	☐ Yes	☐ No	☒ N/A	
Pace Trip Blank Lot # (if purchased):				

CLIENT NOTIFICATION/RESOLUTION

Person Contacted: Date/Time: Field Data Required? ☐ Yes ☐ No

Comments/Resolution:

FECAL WAIVER ON FILE Y N TEMPERATURE WAIVER ON FILE Y N

Project Manager Review: Date: 6-30-15

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

TECHNICAL DATA REVIEW REPORT

7 May 2015
Groundwater Sampling
Elemental Phosphorus (P4) Analyses

Prepared for:
FMC Idaho LLC

Pocatello, Idaho Plant

Prepared by:
Ordway and Associates
and
Environmental Chemistry Consultants, Inc.

20 July 2015

ENVIRONMENTAL CHEMISTRY CONSULTANTS, INC.

10146 Banner Rd., S.E.
Olalla, WA 98359

Tel: (253) 509-4568

e-mail:

Technical: brucekw327@live.com

Data Validation/Usability Report

Groundwater Samples

7 May, 2015 RCRA Event

FMC Idaho LLC, Pocatello, Idaho

ALS Work Order #: 34-1512830

Prepared by: Frederick S. Ordway

20 July 2015

INTRODUCTION

This memo summarizes the Site Chemist's usability evaluation of the technically reviewed groundwater results generated by ALS Laboratory Group, for the SDG listed above. The samples were collected on 7 May 2015. Elemental Phosphorous (P4) laboratory analyses were performed in accordance with the U.S. Environmental Protection Agency (USEPA) SW-846 Method 7580 as described in the laboratory SOP.

The laboratory has modified Method 7580. Method 7580 provides for two different levels of sensitivity for determining P4 in water samples. One method has a sensitivity of 0.01 ug/L and consists of extracting a 500 mL water sample into 50 mL of diethyl ether and then back extracting with water to a final volume of 1.0 mL of diethyl ether. The other method provides sensitivity on the order of 0.1 ug/L and consists of extracting 30 mL of water into 3 mL of isooctane. The laboratory has modified the method to extract 120 mL of water into 3 mL of isooctane with a reported sensitivity of 0.016 ug/L based on the reported MDL with a concomitant reporting limit of 0.050 ug/L. The impacts of the modifications performed by the laboratory are detailed below.

A Level II technical review was performed for this SDG, which included a review/evaluation of all laboratory reporting forms, raw data, preparation logs, instrument printouts, notebook records and forensic deliverables provided by the laboratory. The data were technically reviewed based on method specifications, and laboratory-developed performance criteria by adapting the procedures set forth in the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, USEPA Office of Solid Waste and Emergency Response, EPA-540/R-94-013, February 1994 and USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, USEPA office of Solid Waste and Emergency Response, EPA540/R-94/012, February 1994 (Guidelines).

For elemental phosphorous, the data were evaluated for USEPA SW-846 Method 7580 which included the following parameters:

- data completeness
- holding times**
- calibration
- blanks**
- laboratory control sample**
- matrix spike/matrix spike duplicate**
- compound quantitation and reported detection limits, and
- overall assessment

** Denotes all criteria for this parameter were met

COMPLETENESS

Not all of the pages in the report are paginated. The field chain-of-custody (COC) documented that the samples were checked for zero headspace. The laboratory "Cooler or Container Information Checklist" listed "VOA Headspace Present?" as N/A. All samples received were analyzed, reported and qualified as described below.

CALIBRATION:

Initial Calibration:

The laboratory performed the initial calibration on 7 May 2015 and utilized a second order 1/x 2^{nd} order regression model based on peak height for evaluating the data. The initial calibration was analyzed on 7 May 2015. The samples were analyzed beginning 12 May 2015. Therefore the samples were not analyzed within the 12-hour time limit specified in the method[1] and all samples are qualified as estimated (J).

BLANKS

Sample 505701, Laboratory ID 1512830008 and 505CDI, Laboratory ID 1512830011 are field blanks. All blanks were within method acceptance criteria.

MATRIX SPIKE AND MATRIX SPIKE DUPLICATE

Sample 505123, Lab I.D. 1512830004 was analyzed as the matrix spike and matrix spike duplicate and reported with compliant precision and accuracy; no action required.

SAMPLE RESULT VERIFICATION:

The validator obtained similar results to the laboratory when utilizing a seconded order 1/x weighted calibration model.

Sample ID	Laboratory ID	2^{nd} Order 1/x Validator Calculated Result (ug/L)	Lab Reported Result (ug/L)
505122	1512830003	0.5835	0.58

OVERALL ASSESSMENT:

All samples were extracted in isooctane utilizing a modified less sensitive extraction procedure.

The sample results are qualified as estimated (J) due to use of a non-contemporaneous initial calibration.

[1] SW-846 Method 7580, Section 7.2, Revison 0, December 1996

Sample ID 505601, Laboratory ID 1512830010 and sample ID 505156, Laboratory ID 1512830009 are field duplicates, which had laboratory reported concentrations of less than 0.015 ug/L; no action is required.

Sample 505701, Laboratory ID 1512830008 and 505CDI, Laboratory ID 1512830011 are field blanks and were reported with method complaint results.

APPENDIX A
DEFINITION OF DATA QUALIFIERS

GLOSSARY OF DATA QUALIFIERS

J	-	The associated value is an estimated quantity.
R	-	The data are unusable.
U	-	The parameter is not detected at the reported value.

APPENDIX B
GLOSSARY OF ACRONYMS

GLOSSARY OF ACRONYMS

SDG	-	Sample Delivery Group
USEPA	-	Unites States Environmental Protection Agency
DQO	-	Data Quality Objectives
QAPjP	-	Quality Assurance Project Plan
RPD	-	Relative Percent Difference
CRDL	-	Contract Required Detection Limit
RL	-	Reporting Limit
GFAA	-	Graphite Furnace Atomic Absorption
IDL	-	Instrument Detection Limit
MDL	-	Method Detection Limit
CLP	-	Contract Laboratory Program
ICP	-	Ion Coupled Plasma
MS	-	Matrix Spike
MSD	-	Matrix Spike Duplicate

DATA VALIDATION/USABILITY SUMMARY

August 2015
RCRA Groundwater Sampling
Metals and Wet Chemistry Parameters

Prepared for:

FMC Corporation
Pocatello, Idaho Plant
P.O. Box 4111
Pocatello, ID 83202

Prepared by:

Hydrometrics, Inc.
3020 Bozeman Avenue
Helena, MT 59601

and

Environmental Chemistry Consultants, Inc.
10146 Banner Rd., S.E.
Olalla, WA 98359

23 August 2015

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SDG 10316058

SDG 10316268

ENVIRONMENTAL CHEMISTRY CONSULTANTS, INC.

10146 Banner Rd., S.E.
Olalla, WA 98359

Tel: (253) 509-4568

e-mail:

brucekw327@live.com

Data Validation/Usability Report

Groundwater Samples

FMC Corporation, Pocatello, Idaho

RCRA Groundwater Monitoring Program

Third Quarter 2015

SDGs 10316058 and 10316268

23 August 2015

Prepared by: Bruce K. Wallin, PhD

1. INTRODUCTION

This memo summarizes the Site Chemist's usability evaluation of the technically reviewed groundwater results generated by Pace Analytical Services, Inc., Minneapolis, MN (PACEMN) for FMC's third quarter 2015 Resource Conservation and Recovery Act (RCRA) sampling event for the laboratory sample SDGs listed above. The samples were collected 28 - 30 July 2015. All samples were analyzed for elements and wet chemistries.

For elements, laboratory analyses were performed on all samples in accordance with the U.S. Environmental Protection Agency (USEPA) SW-846 Methods 6010B (cadmium, potassium, and phosphorus) and 6020 (arsenic and selenium), 9056A for chloride, fluoride, nitrate, and sulfate, fluoride from wells providing evidence of interference in Method 9056A also by SM4500-F-C and orthophosphate by SM4500P-E from Standard Methods for the Examination of Water and Wastewater, ammonia by Method 350.1 from Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, Revised March 1983. All of the above methods are hereafter referred to as "Methods". A list of the parameters and associated methods utilized is provided in Table 1-1.

All analyses were conducted by PACEMN.

TABLE 1-1
THIRD QUARTER 2015 RCRA MONITORING EVENT-PARAMETERS AND ANALYTICAL METHODS

PARAMETER	SM (1) METHOD	MCAWW(2) METHOD	SW-846(3) METHOD
Cd, P, and K			6010B
As, Se			6020
ammonia - N		350.1	
chloride			9056A
fluoride	4500-F-C		9056A
nitrate			9056A
ortho-phosphate	4500-P E		
sulfate			9056A

NOTES:

(1) "Standard Methods for the Examination of Water and Wastewater",

(2) "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, March 1983 and subsequent revisions.

(3) "Test Methods for Evaluating Solid Waste, Physical/ Chemical Methods", Third Edition, November 1996 and subsequent revisions.

The data were technically reviewed based on method specifications, and laboratory-developed performance criteria by adapting the procedures set forth in the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, USEPA Office of Solid Waste and Emergency Response, EPA-540-R-04-004, October 2004, and USEPA Contract Laboratory Program National Functional Guidelines for Low Concentration Organic Data Review, Final, OSWER 9240.1-34, EPA540-R-00-006, June 2001 (Guidelines).

For all parameters, a Level III technical review was performed for these SDGs, which included a review/evaluation of all quality control summary forms. Raw data, preparation logs, instrument printouts, notebook records and forensic deliverables provided by the laboratory were not evaluated.

A detailed description and summary of these efforts is provided in the Technical Review Reports in Appendix A.

The following validation/usability report is the result of a collective assessment of all information associated with the analytical results available. The information includes the project-specific data quality objectives (DQOs) specified in the RCRA Interim Status Groundwater Monitoring Plan, as updated in the RCRA Post Closure Plans (FMC, 1999), as well as historical data, site knowledge, and the technical review results.

2. SUMMARY OF USABILITY ISSUES

The data technical review reports indicate which laboratory results are considered non-compliant when compared to the requirements set forth in the relevant documents. However, most of these exceptions are minor quality control problems and do not affect data usability. The cases where the exceptions may impact data usability are discussed in the following sections. In most cases these problems are typical analytical difficulties or are the result of sample matrix problems. A summary of data quality goals and observations is provided in Table 2-1.

DATA USABILITY SUMMARY

For samples 507131, 507114, 507156, 507601, and 507157 only the fluoride results from the ISE Method should be used since they were significantly lower than the IC results.

For this event no additional data were considered unusable.

TABLE 2-1 DATA QUALITY SUMMARY: FMC GROUNDWATER MONITORING PROGRAM
THIRD QUARTER 2015 RCRA SAMPLING EVENT

DATA QUALITY INDICATOR	PURPOSE	METHOD OF MEASUREMENT & EVALUATION	GOAL	SUMMARY OF RESULTS
Precision	Reproducibility of results	1. Collocated samples	S & D >5RL, RPD <30, S &/or D <5RL, S-D <2RL	***All criteria were met - no flagging was required or deemed necessary.***
		2. Laboratory replicates	S & D >5RL, RPD <20, S &/or D <5RL, S-D <RL	***All criteria were met - no flagging was required or deemed necessary.***
Accuracy	Proximity of result to true value	1. Calibration	Meet method/guidance criteria	***Low level (CRI) high for Cd and low for Se - several samples (J+), (J-), respectively.***
		2. Laboratory control samples	Meet lab-developed or method criteria	***All criteria were met - no flagging was required or deemed necessary.***
		3. Matrix spikes/Serial Dilutions	Meet lab-developed or method criteria	***SDG 10316058 ICP serial dilution K 20.7% - all samples estimated (J) to indicate high bias.*** SDG 10316058 MS/MSD recoveries of K high. All positive samples estimated high (J+), ***fluoride (IC) low. SDG 10316268 fluoride (IC) nitrate-N, Cl low. All results (J-).***
Representativeness	Sample integrity and sampling precision	1. Collocated samples	S & D >5RL, RPD <30, S &/or D <5RL, S-D <2RL	***See item 1 above.***
		2. Blanks	Sample results ND or >5X blank	***Positive results for some elements in several samples flagged as not-detected (U) due to blank contamination. Should be considered maximum potential concentrations.***
		3. Holding times	Per method	***No deviations requiring actions.***
		4. Preservation	Per method	***All criteria were met - no flagging was required or deemed necessary.***
Comparability	Consistent practices	Use of and adherence to appropriate analytical methods	Compliance with required USEPA methods	***Method compliance achieved, goal met for all samples.***
Completeness	Obtain intended information from the event	Comparison of planned vs usable data obtained	>90% of planned	***Completeness 100%***
Consistency	Expansion of historical database	Comparison with historical statistics	Meet completeness objective	***Modest outliers, no significant trends apparent. Continue evaluation.***

tab2214r.xls

3. DATA VALIDATION RESULTS

To determine the ultimate utility of data, the following indicators were evaluated:

3.1 PRECISION, ACCURACY, REPRESENTATIVENESS, COMPARABILIITY, COMPLETENESS AND CONSISTENCY

3.1.1 PRECISION

Precision is a quantitative determination of the reproducibility of an analytical value. For this program, collocated samples are collected to assess overall precision of the sampling, preparation and analytical process, and matrix spike/matrix spike duplicates are required to address aliquoting reproducibility in order to provide information on matrix reproducibility otherwise unobtainable from samples reported below the reporting limits. Matrix spikes also provide an indication of the accuracy of native results: this will be discussed in the accuracy section.

The collocated samples further address the ability to obtain a representative sample of the medium studied, this will be discussed further in the representativeness section. For elemental parameters, the methods require the preparation of laboratory replicates at a specified frequency to address aliquoting precision.

For laboratory replicates the Guidelines specify the utilization of difference criteria for samples providing values below a limiting value and relative percent difference (RPD) criteria for samples providing values above a limiting value. The Guidelines utilize 5X the contract required detection limit (CRDL). These specifications are as follows:

When either one or both of the analyses provide results below the limiting value, the following criteria apply:

$$|S - R| \leq CRDL$$

Where: S = sample value
R = replicate sample value

When both of the analyses provide results above or equal to the limiting value, the following criteria apply:

$$RPD = (|S - R|/S + R)200 \leq 20$$

Where: RPD = Relative Percent Difference

The QAPjP provides an RPD specification of 20 percent for laboratory replicates for elements, but does not provide specific criteria for low level results or collocated samples. The Guidelines do not provide precision criteria for collocated samples. The technical reviewer utilized the 20 percent RPD criteria specified in the QAPjP and Guidelines and the low-level criteria above specified in the Guidelines with the substitution of the laboratory reporting limit (RL) for the CRDL where they differed. For collocated samples, the technical reviewer utilized the 2 RL and RPD <30 criteria specified in the USEPA Region I Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses, June 13, 1988.

For this event all replicate sample precision was within specification.

For this event the following are collocated samples:

SDG	SAMPLE	COLLOCATED SAMPLE
10316058	507177	507600
10316268	507156	507601

Note: All parameters were reported to standard laboratory reporting limits (PQL) which approximate estimated quantitation limits (EQL) specified in the methods. The technical reviewer utilized the PQL values to conduct the precision analysis.

For this event all collocated sample precision was within specification.

For all parameters, the laboratories reported to their practical quantitation limits (PQL) and for levels below the PQL to the method detection limit (MDL) flagged with a "J" qualifier. The MDL described in 40 CFR Part 136, Appendix B and incorporated by reference in SW-846, provides a precision of ± 100 percent. With some exceptions the PQL values used by the laboratory, approximate the estimated quantitation limit (EQL) which is established at approximately 5-10X the MDL in SW-846. At 5X the MDL the EQL precision is approximately ± 30 percent. As a result reported positive but below the PQL, but above the MDL should be considered estimates. ***The project manager is cautioned that the imprecision associated with the project-required reporting conventions must be taken into consideration when utilizing the data below the PQL.***

3.1.2 ACCURACY

Accuracy is the proximity of the reported analytical value to the true concentration in the sample. To estimate the proximity factor, laboratory control, laboratory blank and environmental samples are fortified with the parameter of interest, and for organics analysis, each sample is also fortified with surrogate indicators, and the level recovered, expressed as a percentage of the spiking level, is utilized. For laboratory control samples (LCS), the analytical values must be within either a published range or within laboratory or method established windows about the true concentration.

If these conditions are not met, the method is to be considered out of control, corrective action taken, and the entire process repeated with compliant LCS before the associated data can be reported. For elements, laboratory blanks are spiked with low-level reference materials for ICP (CRI). According to the Guidelines associated analytical values must fall within ± 20 percent of the true value or all the potential impact on all environmental sample results associated with the non-compliant CRI must be evaluated during technical review using professional judgment. The technical reviewer has considered that all associated sample results reported at values <2PQL are evaluated for CRI recoveries <80

percent, both positive results and non-detects are flagged as estimated with the potential for low bias (J-), and for CRI recoveries >120 percent, positive results only are flagged as estimated with the potential for high bias (J+).

For the recovery of spiked parameter from environmental samples, the quantity of parameter matrix spiked (MS) must be large enough to be uniquely distinguishable from the level of native analyte present in the sample. When this condition exists, if the recovery value is outside established values, all associated environmental samples are flagged as estimated (J) with an indication of bias direction during technical review. The Guidelines establish that the native level of analyte must be less than four times the spiking level for valid accuracy estimation.

The formula utilized is as follows:

Percent Recovery = ((SSC - USC)/CS))100

Where: SSC = Spiked Sample Concentration
USC = Unspiked Sample Concentration
CS = Concentration Spiked

For elements, the QAPjP establishes acceptance criteria at 70-130 percent that are less stringent than the 75-125 percent specified in the Guidelines. The QAPjP does not specify accuracy criteria for water quality parameters. The technical reviewer has utilized the laboratory-derived limits, as required by SW-846 methods, and the more stringent 75-125 percent criteria specified in the Guidelines where laboratory-established limits were not provided for the water quality parameters.

For elements analyzed by ICP, the method requires assessment of matrix interference by performing serial dilution analyses in addition to the matrix spike indicated above. The Guidelines suggest that, for samples containing sufficient signal in the undiluted sample (>50IDL) that the diluted result should be within 10 percent of the undiluted value to verify absence of interference.

Initial and continuing calibrations are performed to verify instrument performance and stability prior to and during the analysis of environmental samples. The Methods require that the initial calibration linearity coefficients are $\geq$ 0.995, the continuing calibration stabilities are within 90-110 percent and, for elements, the Guidelines require consideration of blanks indicating a negative instrument drift >|IDL|. The technical reviewer has utilized the flagging criteria suggested in the Guidelines for lack of linearity and continuing calibration stability, and has utilized professional judgment for actions for non-compliant instrument drift associated with samples with levels reported at <5 IDL.

For SDG 10316058 the positive results reported <2 PQL for cadmium in samples 507131 and 507114 were flagged as estimated with the potential for high bias (J+) and the result reported for total selenium in sample 507131 was flagged as estimated with the potential for low bias (J-) due to non-compliant CRI recoveries. ***These results are considered usable when the bias factors are taken into account. Doing so will have no impact on the decision since the adjusted values for cadmium and un-adjusted value for selenium are below the Standards.***

For SDG 10316058 sample 507114 provided MS/MSD recoveries of potassium above the upper limit. The positive results reported for this element in all samples associated with the SDG are flagged as estimated with the potential for high bias (J+). ***These results are considered usable when the bias factors are taken into account. Doing so will have no impact on the decision since no Standard is established for this element.***

For SDG 10316058 sample 507114 provided ICP serial dilution stability for potassium above the upper limit at approximately 21% D. The results reported for this element in all samples associated with the SDG are flagged as estimated (J) to signify the potential for high bias (J+). ***These results are considered usable when the bias factors are taken into account. Doing so will have no impact on the decision since no Standard is established for this element.***

For SDG 10316268 the positive results reported <2 PQL for cadmium in samples 507166, 507113, 507168, and 507104 were flagged as estimated with the potential for high bias (J+) and the results reported for total selenium in samples 507156, 507601, and 507157 were flagged as estimated with the potential for low bias (J-) due to non-compliant CRI recoveries. ***These results are considered usable when the bias factors are taken into account. Doing so will have no impact on the decision since the adjusted values for cadmium and un-adjusted value for selenium are below the Standards.***

For SDG 10316058 sample 507114 provided MS/MSD recoveries of fluoride (IC) below the lower limit. The results reported for this parameter in all samples associated with the SDG are flagged as estimated with the potential for low bias (J-). ***These results are considered usable when the bias factors are taken into account. Doing so will have no impact on the decision since no Standard is established for this parameter.***

For SDG 10316268 sample 507123 provided MS/MSD recoveries of fluoride (IC) and nitrate-N and sample 507157 provided MS/MSD recoveries of chloride and nitrate-N below the lower limit. The results reported for these parameters in all samples associated with the SDG are flagged as estimated with the potential for low bias (J-). ***These results are considered usable when the bias factors are taken into account. Doing so will have no impact on the decision since no Standard is established for this parameter.***

For this event all additional accuracy criteria were met.

3.1.3 REPRESENTATIVENESS

To perform a valid environmental assessment, the samples, when analyzed, must be representative of the media under study. Factors influencing representativeness include preparation of wells prior to sampling to obtain aliquots of the groundwater strata of interest. This is accomplished through purging of standing water to constant temperature, conductivity and pH prior to collecting the sample. Collocated samples are also collected

to provide information regarding the ability to reproducibly collect a sample. If reproducibility is not obtained, representativeness is not verified. The sample must be collected with uncontaminated equipment, placed in uncontaminated containers, and not contaminated throughout the transport, receipt, storage, preparation and analytical processes. Evaluation of the potential for contamination is conducted through collection of field blanks, and utilization of laboratory process blanks. Once the sample has been collected, it is maintained in such a state that changes are not expected to occur in its concentration of target parameters. This is accomplished by chemical and physical preservation, and minimization of time from collection to analysis.

A review of the sample receipt logs indicate that preservation requirements were met, therefore, no action was taken.

Blanks were reported with some elements present at concentrations that generated action levels resulting in the flagging of the positive values reported for several samples as not-detected (U) at the reported values. ***These results are considered usable as maximum potential concentrations.***

3.1.4 COMPARABILITY

The characteristic of comparability reflects both the internal consistency of measurements and the expression of results in units that are consistent with other organizations reporting similar data. Each value reported for a given measurement should be similar to other values within the same data set and with other related data sets. Comparability was assured through the use of standardized sampling procedures and USEPA analytical methods.

3.1.5 COMPLETENESS

Completeness is a measure of the extent of attainment of usable data points from an investigation. For this program a completeness goal of 85 percent is established in the

QAPjP. The ability to obtain a sample, (human) error and sample characteristics are major contributors to reduced completeness. For this investigation, all intended samples were collected and received by the laboratory. The laboratory analyzed all of the samples for all of the intended parameters. Completeness for this event is, therefore, 100 percent.

3.1.6 CONSISTENCY

Consistency is a measure of the reasonableness of data to those that have been previously generated. For this program, an extensive data base has been developed that allows the evaluation of analytical results that may represent historical outliers. Based on a comparison to the historical results, a few sporadic differences were noted for this monitoring event; however, the overall results are within the existing variance.

4. REFERENCES

FMC, 1999. "RCRA Interim Status Groundwater Monitoring Plan", Bechtel Environmental, August 1999; as updated in the RCRA Post-Closure Plans as follows:

- Pond 9E post-closure plan, January 2000;
- Slag Pit Sump post-closure plan, September 2001;
- Pond 8E, Phase IV Ponds and Pond 15S post-closure plans, May 2002;
- Pond 16S post-closure plan, July 2003; and,
- Pond 17 and Pond 18 Cell A post-closure plans, August 2004.

USEPA, 2004. Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, Final, USEPA, OSWER, EPA 540-R-04-004, October 2004.

USEPA, Contract Laboratory Program Statement of Work for Inorganics Analysis, Document Number ILM02.0 and latest revisions.

USEPA, 1989. Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses, USEPA Region I, June 13, 1988, Modified by Deborah Szaro, et. al. February 1989.

USEPA, 1983. Methods for Chemical Analysis of Water and Wastes, EMSL, EPA-600/4-79-020, Revised March 1983.

USEPA, 1986. Test Methods for Evaluating Solid Waste, OSWER, SW-846, Third Edition, November 1986.

APPENDIX A

TECHNICAL REVIEW REPORTS

ENVIRONMENTAL CHEMISTRY CONSULTANTS, INC

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Tel: (253) 509-4568

Data Technical Review Report

Groundwater Samples

FMC Corporation, Pocatello, Idaho

East Michaud Flats RFI

Third Quarter 2015

SDGs 10316058 and 10316268

23 August 2015

Prepared by: Bruce K. Wallin, PhD

This memo summarizes the technical review of groundwater results generated by PACEMN for FMC's third quarter 2015 Resource Conservation and Recovery Act (RCRA) sampling event for the laboratory SDGs listed above. The samples associated with all SDGs were analyzed for elements and wet chemistries.

Laboratory analyses were performed in accordance with the U.S. Environmental Protection Agency (USEPA) SW-846 Methods and methods from Standard Methods for Examining Water and Wastewater and Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, Revised March 1983 and. All of the above methods are hereafter referred to as "Methods". A list of the parameters and associated methods utilized is provided in Table 1-1.

TECHNICAL REVIEW REPORT

SDG 10316058

ELEMENTAL PARAMETERS

TECHINCAL REVIEW REPORT

SDG 10316058

ELEMENTAL PARAMETERS

The data evaluation was based on USEPA SW-846 Method 6010B for cadmium, and potassium, and 6020 for arsenic and selenium (Methods) and included the following parameters:

- calibration
- blanks
* - ICP interference check sample
- matrix spike analysis
- duplicate sample analysis
* - laboratory control sample analysis
- ICP serial dilution analysis
* - ICPMS internal standard analysis
- detection limits
- overall assessment

* All criteria were met for this parameter.

Table A-1 summarizes the technical review actions that are detailed below.

Data validation, described in SW-846 and the Guidelines, which includes an evaluation of the usability of technically reviewed results with respect to project Data Quality Objectives and site chemistry knowledge, is included in the Data Validation/Usability Report.

CALIBRATION:

Low-level calibrations (CRI) providing recoveries not within 90-110% are tabulated below:

CRI ID.	ELEMENT	RECOVERY (%)
8-3/00:25	cadmium	123.4
	potassium	84.8
7-31/16:31	selenium	114.6
8-7/03:20	selenium	83.8

Associated samples requiring actions:

CRI ID	ELEMENT	ASSOCIATED SAMPLES	
8-3/00:25	cadmium	507131	507114
8-7/03:20	selenium (total)	507131	

Action:

- For recovery above the upper limit positive results reported <2 PQL are flagged as estimated with the potential for high bias (J+).
- For recovery below the lower limit results reported <2 PQL are flagged as estimated with the potential for low bias (J-).

Comment:

Only calibrations bracketing samples associated with this SDG are evaluated.

BLANKS:

Blanks providing positive results and their associated action levels (AL) are tabulated below:

BLANK ID.	ELEMENT	CONCENTRATION (mg/L)	AL (mg/L)
CCB 7-30/18:15	potassium	0.146	0.705
CCB 7-30/18:48	potassium	0.224	1.12
CCB 8-3/01:55	potassium	0.521	2.61
CCB 8-3/02:34	potassium	0.205	1.03
CCB 8-3/03:09	potassium	0.360	1.80
507CDI	potassium	0.28	1.4

Associated samples with positive results reported below the action level: NONE

Comments:

Only calibration blanks bracketing the samples associated with the SDG were evaluated.

MATRIX SPIKE ANALYSIS:

Samples providing matrix spike (MS)/MS duplicate (MSD) recoveries or precision not within the laboratory-established limits when the native level is reported at less than four times the spiking level are tabulated below:

SAMPLE ID.	ELEMENT	MS/MSD RECOVERY (%)
507114	potassium	140/176

Action:

- For both MS and MSD recoveries above the upper limit positive sample results reported for the element are flagged as estimated with the potential for high bias (J+).

Comments:

The above action is applied to all environmental samples associated with the SDG.

DUPLICATE SAMPLE ANALYSIS:

Comments:

For this SDG sample 507600 is collocated with sample 507177. For this collocated sample pair all precision limits specified in the QAPP were met.

ICP SERIAL DILUTION ANALYSIS:

Samples containing more than 50 MDL of analyte providing 5X serial dilution values differing by more than 10% (%D) are tabulated below:

SAMPLE ID.	ELEMENT	%D
507114	potassium	20.7

Action:

- Results reported for the analyte are flagged as estimated (J).

Comments:

The diluted value was smaller than the undiluted value, therefore, high bias is indicated.

The above action is applied to all environmental samples associated with the SDG.

DETECTION LIMITS:

For this SDG, the laboratory was required to report results to their method detection limit (MDL). The MDL (described in 40CFR Part 136, Appendix B and incorporated by reference in SW-846), provides an error band, by definition, of $\pm$ 100 percent. The Estimated Quantitation Limit (EQL), is established at 5-10X the MDL in SW-846.

Action:

- Positive results reported between the MDL and PQL are flagged as estimated (J).

Comments:

The data user is cautioned that these results may not be analytically reproducible or statistically valid.

OVERALL ASSESSMENT:

The positive results reported <2 PQL for cadmium in samples 507131 and 507114 are flagged as estimated with the potential for high bias (J+) due to non-compliant CRI recovery.

The result reported <2 PQL for total selenium in sample 507131 is flagged as estimated with the potential for low bias (J-) due to non-compliant CRI recovery.

The positive results reported for potassium in all environmental samples are flagged as estimated with the potential for high bias (J+) due to non-compliant MS/MSD recoveries.

The results reported for potassium in all environmental samples associated with the SDG are flagged as estimated (J) due to non-compliant serial dilution reproducibility.

Positive results reported between the MDL and PQL are flagged as estimated (J) due to uncertainty at the low level.

All additional QC results reviewed were within specification and no further actions or qualifiers were necessary.